

Appl. No. 09/966,605
Reply to Office action of 11/18/2003

REMARKS

Entry of the above amendment and reconsideration of the above-referenced application in view of the above amendment, and of the following remarks, is respectfully requested.

Claims 1-15 are pending in this case. Claims 16-20 are cancelled herein.

The Examiner rejected claims 1-2, 4, 7, 8 under 35 U.S.C. § 102(e) as being unpatentable over Hung et al. (U.S. 6,380,096) in view of Hsieh et al. (U.S. 6,455,431).

Applicant respectfully submits that claim 1 is unpatentable over Hung in view of Hsieh, as there is no disclosure or suggestion in the references of etching a low-k dielectric layer using a resist pattern and treating the low-k dielectric layer with a plasma having a bias power on the order of 400W, wherein the treating step occurs in-situ with respect to the etching step. Hung teaches a dual damascene process sequence in which a post-etch treatment (PET) is performed to ash the resist and remove residues left as a result of a fluorocarbon etch. Hung teaches to perform the PET under zero/very low bias power (Table 5 and col. 10 lines 48-57). Hung further states that the bias power is typically less than 20% of that used in the selective etch (i.e., 1400W). Hsieh is added to teach that the bias power in ICP tools is typically in the range of 100 to 400 W. The bias power taught in Hung, 0 to less than 280, partially overlaps the range taught in Hsieh, 100 to 400. Thus, there is no motivation provided by the references that would motivate one of ordinary skill in the art to modify the bias power as taught in Hung to accomplish the claimed invention since the range taught in Hung already falls partially within the range suggested in Hsieh. Hsieh teaches a generic range for the tool without respect to a specific process

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whereas Hung teaches a more specific range for a specific process. The combined teachings of the references would not suggest the claimed invention to one of ordinary skill in the art. Accordingly, Applicant respectfully submits that claim 1 and the claims dependent thereon are patentable over Hung in view of Hsieh.

The Examiner rejected claim 3 under 35 U.S.C. § 103(a) as being unpatentable over Hung et al. (U.S. 6,380,096) in view of Hsieh et al. (U.S. 6,455,431) and further in view of Tamaoka et al. (U.S. 6,232,237).

Applicant respectfully submits that claim 3 is patentable over the references for the same reasons discussed above relative to claim 1, from which claim 3 depends. Tamaoka is applied by the Examiner to teach a plasma treatment using H₂O to remove a resist pattern.

The Examiner rejected claim 5 under 35 U.S.C. § 103(a) as being unpatentable over Hung et al. (U.S. 6,380,096) in view of Hsieh et al. (U.S. 6,455,431) and further in view of Lin et al. (U.S. 6,342,448).

Applicant respectfully submits that claim 5 is patentable over the references for the same reasons discussed above relative to claim 1, from which claim 5 depends. Lin is applied by the Examiner to teach a low-k dielectric of FSG or OSG.

The Examiner rejected claim 6 under 35 U.S.C. § 103(a) as being unpatentable over Hung et al. (U.S. 6,380,096) in view of Hsieh et al. (U.S. 6,455,431) and further in view of Cox (U.S. 6,166,439).

Applicant respectfully submits that claim 6 is patentable over the references for the same reasons discussed above relative to claim 1, from which

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claim 6 depends. Cox is applied by the Examiner to teach a low-k dielectric material having a dielectric constant less than 2.0.

The Examiner rejected claims 9-10 under 35 U.S.C. § 103(a) as being unpatentable over Hung et al. (U.S. 6,380,096) in view of Hsieh et al. (U.S. 6,455,431) and further in view of Yamazaki (U.S. 6,350,701).

Applicant respectfully submits that claims 9-10 are patentable over the references for the same reasons discussed above relative to claim 1, from which claims 9 and 10 depend. Yamazaki is applied by the Examiner to teach performing the ashing and etching steps in separate chambers transferred under vacuum.

The Examiner rejected claims 11-12, 14 under 35 U.S.C. § 103(a) as being unpatentable over Hung et al. (U.S. 6,380,096) in view of Hsieh et al. (U.S. 6,455,431) and further in view of Lin et al. (U.S. 6,042,999).

Applicant respectfully submits that amended claim 11 is patentable over Hung in view of Lin as there is no disclosure or suggestion in the references of etching a via using a via resist pattern and removing the via resist pattern using a plasma treatment to reduce poisoning by a nitrogen source, wherein the plasma treatment occurs in-situ with respect to the etching step and occurs under a bias power of approximately 400W. Hung teaches a dual damascene process sequence in which a post-etch treatment (PET) is performed to ash the resist and remove residues left as a result of a fluorocarbon etch. Hung teaches to perform the PET under zero/very low bias power (Table 5 and col. 10 lines 48-57). Hung further teaches that the bias power is typically below 20% of that used in the selective etch. Hsieh is added to teach that the bias power in ICP tools is typically in the range of 100 to 400 W. The bias power taught in Hung, 0 to less than 280, partially overlaps the range taught in Hsieh, 100 to 400. Thus, there is

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no motivation provided by the references that would motivate one of ordinary skill in the art to modify the bias power as taught in Hung to accomplish the claimed invention since the range taught in Hung already falls partially within the range suggested in Hsieh. Hsieh teaches a generic range for the tool without respect to a specific process whereas Hung teaches a more specific range for a specific process. The combined teachings of the references would not suggest the claimed invention to one of ordinary skill in the art. Lin is applied to teach partially filling the via with an ARC. Accordingly, Applicant respectfully submits that claim 11 and the claims dependent thereon are patentable over Hung in view of Hsieh and Lin.

The Examiner rejected claim 13 under 35 U.S.C. § 103(a) as being unpatentable over Hung et al. (U.S. 6,380,096) in view of Hsieh et al. (U.S. 6,455,431) and further in view of Lin et al. (U.S. 6,042,999) and further in view of Tamaoka et al. (U.S. 6,232,237).

Applicant respectfully submits that claim 13 is patentable over Hung in view of Lin and Tamaoka for the same reasons discussed above relative to claim 11 from which claim 13 depends.

The Examiner rejected claim 15 under 35 U.S.C. § 103(a) as being unpatentable over Hung et al. (U.S. 6,380,096) in view of Hsieh et al. (U.S. 6,455,431) and further in view of Lin et al. (U.S. 6,042,999) and further in view of Yamazaki (U.S. 6,350,701).

Applicant respectfully submits that claim 15 is patentable over Hung in view of Lin and Yamazaki for the same reasons discussed above relative to claim 11 from which claim 15 depends.

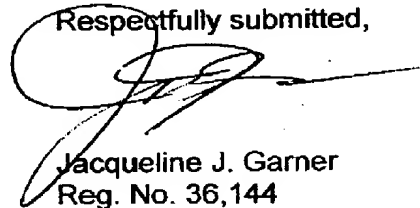
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The Examiner rejected claims 16-18 under 35 U.S.C. § 102(e) as being unpatentable over Hung et al. (U.S. 6,380,096) in view of Hu (U.S. 6,316,354). Claims 16-18 are cancelled.

The Examiner rejected claims 19-20 under 35 U.S.C. § 102(e) as being unpatentable over Hung et al. (U.S. 6,380,096) in view of Hu (U.S. 6,316,354) and further in view of Yamazaki (U.S. 6,350,701). Claims 19-20 are cancelled.

In light of the above, Applicant respectfully requests withdrawal of the Examiner's rejections and allowance of claims 1-15. If the Examiner has any questions or other correspondence regarding this application, Applicant requests that the Examiner contact Applicant's attorney at the below listed telephone number and address.

Respectfully submitted,



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